HHS Public Access

Author manuscript

Food Nutr Bull. Author manuscript; available in PMC 2015 August 24.

Published in final edited form as:

Food Nutr Bull. 2013 December ; 34(4): 434–443.

UNICEF–CDC global assessment of home fortification interventions 2011: Current status, new directions, and implications for policy and programmatic guidance

Maria Elena Jefferds,
US Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Laura Irizarry,
Consultant of UNICEF

Arnold Timmer, and
UNICEF, New York

Katie Tripp
US Centers for Disease Control and Prevention, Atlanta, Georgia, USA

Abstract

Background—Micronutrient powders (MNP) reduce anemia and improve iron status in children aged 6 to 23 months. Little is known about home fortification interventions in low-income and middle-income countries.

Objective—To describe highlights of the Global Assessment of Home Fortification Interventions 2011, new directions, and needed policy and programmatic guidance.

Methods—A cross-sectional survey of home fortification interventions was conducted. Staff at UNICEF and regional focal points at Home Fortification Technical Advisory Group partner agencies sent questionnaires to representatives in 152 low-income and middle-income countries. Included interventions met the following criteria: they were for prevention and used MNP, lipid-based nutrient supplements (LNS), or complementary food supplements (CFS); one recommended mode of use was mixing into food; they were implemented or planning to start within 12 months; and research interventions were directly linked to programs.

Results—This study identified 63 implemented interventions (36 countries) and 28 planned interventions (21 countries), including 34 implemented interventions (22 countries) and 25 planned interventions (20 countries) that used MNP. These interventions were expected to reach 17.2 million people in 2011, including 14.1 million participants in MNP interventions. Among implemented interventions, 16% distributed nationally. Most interventions used integrated approaches targeting young children. Recently, there was increasing expansion of interventions in

Please direct queries to the corresponding author: Maria Elena Jefferds, Centers for Disease Control and Prevention, 4770 Buford Hwy MS-F-77, Atlanta, GA 30341, USA; mjefferds@cdc.gov.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention or UNICEF.

Africa. The main challenges identified were monitoring and evaluation, adherence, product funding, and procurement.

Conclusions—Home fortification interventions, especially those that use MNP, are increasing and scaling up rapidly in regions with widespread problems of micronutrient deficiencies and stunting. Home fortification interventions contribute to global initiatives to reduce undernutrition.

Keywords

Complementary food supplement; home fortification; intervention; lipid-based nutrient supplement; micronutrient powders; program guidance

Introduction

In low-income and middle-income countries, home fortification is emerging as an important component of interventions to prevent anemia and micronutrient deficiencies, improve infant and young child feeding (IYCF), and respond to humanitarian emergencies. Home fortification, also referred to as point-of-use fortification, includes several products in powder or paste form that are mixed into foods soon before consumption. These products are available in combinations of micronutrients alone or with other essential nutrients, potentially including protein, essential fats, amino acids, or enzymes that are missing or not available in adequate amounts in the usual diet. When appropriately used, they are generally accepted by intervention participants [1, 2]. Home fortification can be used with any vulnerable population, starting with children at 6 months when complementary feeding begins.

Over the past 10 years, government agencies and their partners have used home fortification interventions worldwide, but with little global guidance published on policy, design, implementation, or monitoring. To address the need for global guidance, UNICEF and the Centers for Disease Control and Prevention (CDC) worked with other partners to develop and conduct a series of regional workshops on the use of home fortification interventions as part of IYCF programs, focusing primarily on micronutrient powders (MNP). From 2009 to 2013, delegations from 66 countries participated in five regional workshops in Asia, Latin America and the Caribbean, Africa (n = 2), the Middle East and Northern Africa, and the Commonwealth of Independent States [3]. These workshops highlighted the need to better understand the scope, scale, and challenges of all home fortification interventions (implemented and planned) in order to develop guidance documents and tools and to mobilize technical support and financial resources. As a result, UNICEF and CDC, in collaboration with the Home Fortification Technical Advisory Group (HF-TAG), designed a cross-sectional assessment to identify and describe all home fortification interventions implemented or planned in low-income and middle-income countries in 2011. A full report on this assessment, *Global Assessment of Home Fortification Interventions 2011*, was recently published [4]. This paper briefly describes key highlights of the assessment, opportunities and challenges in home fortification, new directions, and the need for global policy and programmatic guidance.

Methods

Design and data collection procedures

Information for the Global Assessment of Home Fortification Interventions 2011 was collected with help from staff at UNICEF Headquarters and 15 HF-TAG regional focal points from 9 HF-TAG partner agencies. These staff e-mailed a description of the assessment; a pretested, self-administered questionnaire (in English, French, and Spanish); and an invitation to participate to at least one representative in each of 152 low-income and middle-income countries. Representatives in the 152 countries were generally country-based nutrition staff working for the United Nations or other international agencies (e.g., UNICEF, World Food Programme, Helen Keller International) or for national governments (e.g., Ministry of Health staff). Representatives were encouraged to invite other relevant partners in their countries to help complete the questionnaire. In addition, data on 2010/11 product procurement orders from four global manufacturers were cross-checked to identify any missing interventions. In May 2011, an Internet search was performed to identify home fortification interventions among partners that are not part of the HF-TAG. Examples of search terms included MNP, Plumpy'doz, and home fortification. Data were collected from May to September 2011.

Interventions could be for any population group and had to meet five inclusion criteria: the intervention was for prevention, not exclusively treatment, purposes and was using either MNP, lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS) composed of micronutrients and also possibly protein, essential fats, specific amino acids, or enzymes; one recommended mode of use was by mixing into food; the interventions were being implemented or were planned to start within 12 months of the assessment; research interventions were directly linked to a program, as the aim of the assessment was to capture programmatic interventions and not exclusively research studies; and the interventions were in 1 of 152 low-income or middle-income countries. A more detailed description of the methods used in this assessment is provided in the final report [4].

Questionnaire

The questionnaire collected information on the current status of each intervention—including key inputs, activities, and outputs—consistent with the categories in the World Health Organization (WHO)/CDC logic model for micronutrient interventions in public health [5]. Examples include policies, organization types supporting and funding the intervention, intervention objectives and structure, activities to develop and deliver the intervention, expected reach, and challenges.

Data management and analysis

Upon return, questionnaires were reviewed for completeness and duplication. Unclear information was clarified with participants by e-mail or phone when necessary. Data were entered into an SPSS, version 20, database. Frequencies of all variables were analyzed for MNP, LNS, and CFS interventions globally, by region, and by status (implemented or planned). World maps were used to show the distribution of interventions globally. The

CDC determined that the assessment was research not involving human subjects and therefore did not need institutional review board approval.

Results

At least one representative in each of 152 countries was invited to participate in the assessment and received a questionnaire. The total number of representatives invited to participate is not known. In some countries, multiple representatives received invitations if more than one HF-TAG regional focal point sent the invitation to their in-country contacts, which could include individuals from multiple agencies in a given country. For example, in Bolivia representatives were invited to participate and received questionnaires from UNICEF, the Micronutrient Initiative, and the World Food Programme. A total of 129 questionnaires were returned, including at least one from 109 countries (72%) reporting on a total of 91 implemented or planned home fortification interventions (MNP, LNS, or CFS). Sixty-three home fortification (MNP, LNS, or CFS) interventions were being implemented in 36 countries and 28 MNP or LNS interventions were planned to start in 21 countries within 12 months (table 1). There were no CFS interventions planned to start within 12 months in this assessment. Respondents from 38 countries reported an interest in starting 57 MNP, LNS, or CFS interventions in the future. Of the implemented interventions, five started before 2006 (two CFS interventions in Botswana in 1993, one in Madagascar in 2002, and one in Niger in 2005; one MNP intervention in Mongolia in 2000), while the rest (58) started in 2006 or later.

Scale and reach of interventions

Of the 63 implemented interventions, 57% were operating at subnational levels, while 27% were in the pilot phase and 16% were operating nationally. Four MNP, two LNS, and four CFS interventions currently carried out national-level distribution (data not shown), while 50% of implemented MNP interventions planned a final scale of national-level distribution (table 2).

The expected reach of existing interventions exceeded 17.2 million participants in 2011, including more than 14.1 million participants in MNP interventions, more than 1.1 million in LNS interventions, and more than 1.9 million in CFS interventions. More than 35% of implemented MNP interventions expected to reach more than 100,000 participants (table 2). One MNP intervention in Bangladesh expected to reach 10 million participants through market-based distribution. By contrast, a national CFS program in Belize for children aged 6 to 23 months that requires families to buy the product expected to reach fewer than 1,000 participants in 2011.

Regional distribution of interventions

The majority of implemented MNP interventions were in the Latin America and Caribbean region (n = 14 interventions in nine countries) and the South Asia region (n = 11 interventions in five countries). The largest number of planned MNP interventions was in the sub-Saharan Africa region (eight interventions in eight countries) and the East Asia and the Pacific region (seven interventions in five countries). The majority of implemented LNS

and CFS interventions were in the sub-Saharan Africa region (12 LNS interventions in nine countries; 9 CFS interventions in six countries). Among the respondents from 38 countries that expressed interest in starting an MNP, LNS, or CFS intervention in the future, 22 (67%) were from countries in Africa.

Policies, partnerships, and funding

The inclusion of home fortification interventions in national nutrition policies and plans of action reflects an institutionalized commitment by governments and other stakeholders to support these interventions. This assessment found that home fortification strategies were included in national nutrition policies and plans of action for 40% of implemented interventions. More than three-quarters of implemented interventions had a coordinating body that oversaw the design and execution of the intervention (data not shown). National governments and multilateral organizations supported the implementation of 50% or more of interventions (fig. 1). Multilateral organizations and international donor governments or agencies were the two leading types of organization funding interventions (fig. 2). Although national governments provided funding for MNP interventions, particularly in Latin America and the Caribbean through social protection programs, they did not fund interventions that distributed LNS or CFS products. For LNS interventions, private companies funded 5 (30%) implemented interventions and one planned intervention. With few exceptions, most interventions gave MNP and LNS products to participants at no cost. However, 50% of CFS interventions (all in sub-Saharan Africa) required participants to pay all or part of the cost for the product, with half of these interventions subsidizing the product cost.

Intervention integration, objectives, expected outcomes, and populations

Most home fortification interventions were integrated into other programs (table 2). Implemented and planned MNP interventions, planned LNS interventions, and implemented CFS interventions were integrated most commonly with IYCF programs. CFS interventions were also commonly integrated with micronutrient prevention and control programs (data not shown). Implemented LNS interventions were integrated most frequently with humanitarian response programs and programs designed to prevent moderate acute malnutrition. LNS can also be consumed directly without mixing into food, and although all implemented LNS interventions were designed to reach children at the complementary feeding age (starting at 6 months), only 38% were part of IYCF programs.

Because the interventions examined in this assessment were integrated into other programs, they typically reported objectives and expected outcomes different from those expected for stand-alone interventions, depending on the product (table 2). For example, MNP alone have not been shown to reduce stunting or improve complementary feeding practices, but this objective was often reported for integrated IYCF and MNP programs. The most frequently reported expected outcome for implemented MNP interventions was to reduce anemia (59%). For implemented LNS interventions, it was to prevent and treat moderate acute malnutrition (24%). For implemented CFS interventions, it was to improve nutrition status (67%). This assessment also found inconsistencies with some stated objectives and expected

outcomes. For example, 94% of implemented MNP interventions had objectives for anemia prevention and control, but only 59% reported anemia reduction as an expected outcome.

Most implemented MNP interventions were for children aged 6 to 59 months (41%) or 6 to 23 months (38%). For planned MNP, LNS, and CFS interventions, the most frequently reported population was children aged 6 to 23 months. Some interventions were designed to reach populations other than young children, including school-aged children (three implemented and two planned MNP interventions) and pregnant and lactating women (one CFS intervention) and all members of the households (one CFS intervention).

Product formulations

LNS interventions (implemented and planned) used medium-quantity or small-quantity formulations. For children younger than 5 years, eight different MNP formulations were used. The most common had either five micronutrients (15 implemented and 5 planned MNP interventions) or 15 micronutrients (13 implemented and 11 planned MNP interventions). In addition, three implemented interventions each reported use of a different MNP formulation. Two MNP formulations were used with school-aged children (implemented and planned interventions), while 10 different CFS formulations were used with 12 implemented CFS interventions.

Distribution and recommended use

Interventions most frequently distributed home fortification products to participants on a monthly basis, and they typically used more than one distribution channel (table 2). One unique aspect of implemented and planned MNP interventions was distribution through meals provided at early childhood development centers and in schools. Most interventions give the MNP sachets directly to the parents or caretakers, who then must mix the MNP into food for their child, but with institutional approaches (early childhood development centers and schools), the MNP is added directly to food provided through institutional feeding programs and does not always require the involvement of parents or caretakers. For implemented MNP interventions, participants most frequently received 60 sachets (32%), 30 sachets (18%), or 15 sachets (18%) at each distribution. For planned MNP interventions, 40% expected to give 30 sachets (and another 40% had missing data). Daily product intake was most frequently recommended (implemented MNP, 56%; planned MNP, 36% implemented LNS, 88%; planned LNS, 67%; and implemented CFS, 58%). For implemented and planned MNP interventions, the most frequently recommended intake schedule was one sachet a day. In institutional settings that use multiple-serving sachets (e.g., early childhood development centers, schools), the suggestion was to add MNP to a single meal a day when the institution was open (typically five days a week when in session). Most implemented LNS interventions used products packaged in pots, and they gave out four pots at each distribution (77%); the suggested intake was three teaspoons three times a day. CFS interventions distributed products in packages of different sizes and had the most variability of suggested intake, which made it difficult to summarize these data (data not shown).

Documentation of implementation plans

Not all interventions had written plans in place for key functions (table 2). For example, 79% of implemented MNP interventions had a behavior change communication plan in place, 91% provided group meetings and counseling to participants, 85% provided individual meetings and counseling, and 94% distributed print media. A monitoring plan was in place for 76% or more of implemented MNP, LNS, and CFS interventions. Seventy-one percent of implemented MNP interventions, 59% of implemented LNS interventions, and 92% of implemented CFS interventions had a written protocol to check the quality of home fortification products. It was common for implemented interventions to report "ever having a problem" with product quality (MNP, 24%; LNS, 12%; CFS, 42%).

Delivery of behavior change strategy and local tailoring of product packaging

For most interventions, multiple people were responsible for delivering behavior change strategies to participants. Community health workers and government employees were most frequently reported performing these duties (data not shown). The fortification products used have standard packaging, but some interventions developed local names and images (table 2) to appeal to local populations as a way to support coverage and adherence. No implemented LNS interventions had developed a local name or image.

Top challenges to implementation

Respondents were asked to report the top three challenges to implementing their interventions. For implemented interventions, challenges involved issues related to monitoring and evaluation, funding for home fortification products, adherence, and procurement (fig 3). Similar challenges were reported for planned MNP interventions (data not shown). Other challenges reported included technical and logistical problems and a lack of acceptability by stakeholder and user groups (data not shown).

Discussion

During the past 5 years, home fortification interventions have rapidly expanded in low-income and middle-income countries, expecting to reach more than 17.2 million participants in 2011, mostly young children. Recent global movements, such as Scaling Up Nutrition (SUN) [6], are supporting the scale-up of interventions that focus on the first 1,000 days of life (from the start of a woman's pregnancy until the child's second birthday). In addition, the Millennium Development Goals [7] established in 2000 at a United Nations summit include a call to improving early child nutrition. The findings of the *Global Assessment of Home Fortification Interventions 2011* [4] suggest that home fortification can contribute to these global efforts. Of the 91 implemented and planned home fortification interventions assessed, 57% were for children younger than 2 years and 91% were for children younger than 5 years. Eighty-two percent of these interventions planned a final scale distribution at subnational or national levels, and most were part of integrated approaches, especially IYCF programs. Interventions that used MNP were found to be the most common, accounting for 82% of the more than 17.2 million people expected to be reached in 2011 with these interventions. Despite the recent success and reach of home fortification interventions, the

problems of anemia and micronutrient deficiencies are widespread, with more than 285 million children younger than 5 years reported to have anemia [8].

Despite the emphasis on the first 1,000 days of life in recent global programs, only 1 of the 91 interventions reported as part of this assessment was for pregnant or lactating women. The standard intervention approach for pregnant and lactating women remains supplementation with tablets or pills. Not enough evidence exists for WHO to recommend MNP interventions for pregnant women [9], and this area warrants future research.

Use of MNP in sub-Saharan Africa was previously limited because of the uncertain safety of providing home fortification with iron in malaria-endemic areas [10], but a recent WHO guideline [11] recommended the use of MNP with malaria interventions in endemic areas. This assessment found the largest concentration of planned MNP interventions and implemented CFS and LNS interventions in sub-Saharan Africa. This trend is expected to continue because of the widespread problem of malnutrition in this area and the emphasis of initiatives such as SUN [6].

Among planned MNP interventions, more intend to focus on children aged 6 to 23 months than on those aged 6 to 59 months. A recent WHO guideline that recommends the use of MNP for children aged 6 to 23 months [11] was published after data were collected for this assessment, and it is currently the only WHO guideline supporting the use of any home fortification intervention. WHO and CDC are currently conducting a systematic review of the use of MNP interventions for children aged 2 to 12 years [12]. Promising areas of expansion include the use of MNP for school-aged children and the use of multiserve MNP in institutional settings (e.g., schools, early childhood development centers). MNP interventions that use multiserve or individual sachets in institutional settings could be a promising approach, because sustained adherence will likely be higher among participants who regularly attend an institution, and more than 30% of implemented interventions reported adherence as a challenge to their efforts.

Another common challenge for interventions is procurement and funding for home fortification products. One concern with procurement has been the long time between placing an order and receiving the product, which can take several months. Manufacturers report that they have been working to better predict the annual global need for home fortification products, which should shorten delivery times and correct other problems with procurement. Interventions that decide to “brand” products with local names and packages may find that the process is time-consuming. However, if these efforts are planned and well defined, they should not delay procurement or implementation or increase costs. Manufacturers report that repeat orders of products with local branding are delivered in the same time frame as those with generic packaging. Locally branded packaging is preferred because it promotes acceptability and adherence.

The emergence of a global emphasis on the first 1,000 days of life may increase the focus on interventions for children younger than 2 years. This approach will be less costly than the practice of distributing home fortification products to children up to the age of 5 years. Some evidence also suggests that interventions that use intermittent or flexible regimens

might be able to prevent or reduce anemia and nutritional deficiencies as well as daily regimens at a lower cost [13]. Further research is needed on these regimens. Although home fortification has been adopted as an effective intervention and is rapidly gaining momentum in many countries, a global mechanism for funding and scaling up these interventions has not been established, as has occurred for other global public health success stories such as the efforts of the GAVI Alliance to increase immunizations in poor countries or the work of the Global Fund to reduce HIV infection, tuberculosis, and malaria worldwide; in the future this could be a way to strategically support the expansion and scale-up of home fortification interventions. Compared with MNP products, LNS and CFS products are more expensive to produce, transport, and store because of their composition, weight, and size. Research is needed to determine the added benefit of LNS and CFS products over MNP for improved health and functional outcomes, such as growth, and the effect these would have on economic development and future economic returns for countries.

Public health programs have an established history of charging for products such as contraceptives [14], and some home fortification interventions require that participants buy the product at cost or at a subsidized price (e.g., 50% of those using CFS products and a large-scale MNP intervention in Bangladesh). More information about participants' ability and willingness to pay for products is needed to help public health officials create sustainable programs that will improve public health. Potential benefits of having people pay for home fortification products include making interventions more sustainable, supporting their expansion to a larger scale or to additional groups (e.g., children aged 24 to 59 months), decreasing the cost to the public health system so it can focus on free delivery to populations that cannot be reached otherwise, and increasing the value participants place on these products because they have to use their own money to buy them, which could also increase coverage and adherence. These potential benefits of having participants pay for home fortification products warrant further research.

This assessment explored issues related to sustainability and increasing the scale of interventions, which involve dynamic and multifaceted processes [15–20]. The findings suggest that a large percentage of home fortification interventions are working to make their efforts more sustainable and to increase their scale. For example, many of the interventions had institutionalized their policies and activities; involved diverse organizations, stakeholders, and funders; integrated their delivery methods and approaches; and documented their plans for key components. They were also using a variety of people to deliver the behavior change communication strategies needed to increase the reach of the interventions and support sustained adherence and appropriate use.

Most interventions were started in the absence of published global technical and programmatic guidelines. To address this problem, UNICEF and CDC in collaboration with partners held a series of regional IYCF home fortification workshops [3] and conducted this assessment, which identified many different program designs and implementation methods in current interventions. In addition, HF-TAG has supported the development of several guidelines on how to design and implement home fortification interventions, including a programmatic guidance brief on the use of MNP published in late 2011 [21]. HF-TAG has also developed a comprehensive manual on how to monitor home fortification interventions

[22], which was identified as a top challenge in this assessment. Other HF-TAG guidance documents are under development, including an MNP composition manual and a quality assurance manual for MNP manufacturing.

A characteristic of effective interventions is the development and implementation of written documents detailing key components of the intervention package and monitoring plan. In order to support adequate coverage and appropriate use, practically all interventions require a behavior change component, with a possible exception if the home fortification product is added without the active involvement of the caretakers or participants (e.g., in schools and early childhood centers as part of school feeding programs). Although virtually all interventions reported carrying out behavior change strategies, not all of them had a behavior change plan in place. Similarly, not all projects reported having a monitoring plan in place, which is especially problematic for improving program effectiveness and for scaling up interventions that sustain their impact. The lack of written plans for these components is a potentially important weakness of these interventions.

Another potential concern is the inconsistency between some of the stated intervention objectives and the expected outcomes. This might reflect lack of capacity for designing programs or monitoring and evaluation. The inconsistency could also reflect misunderstanding of the expected impacts of home fortification interventions when they are carried out as part of integrated intervention packages that include additional interventions. Ideally, a comprehensive HF-TAG guidance document for designing and implementing MNP programs (under development) and the recently disseminated home fortification monitoring manual [22] will help address some of these issues.

Policy and programmatic guidance is also needed on how to translate research into practice for home fortification interventions, particularly on how to achieve sustained adherence, a top challenge identified in this assessment. In addition, there is a need to develop a community of practice among those involved in developing and implementing home fortification interventions to support each other’s efforts, share experiences and lessons learned, and provide technical assistance to people designing and implementing interventions at local levels.

The limitations of this assessment include potential errors related to self-report or missing data if the participants were not familiar with or misunderstood the content, language, or format of the questionnaire or if they chose not to participate. Furthermore, the reported data were not verified with other sources. WHO and partner agencies that are not part of HF-TAG were not directly contacted to participate, and some respondents in countries with interventions did not participate. Data were not collected on interventions that have ended, which might have provided additional information, particularly on sustainability and longer-term challenges. Interventions mature and evolve quickly, and many are now more developed (especially the planned interventions) than they were when the data were collected in 2011. The strength of this assessment is that it is the first global assessment of home fortification interventions being implemented or planned. Information was collected in a systematic way, multiple methods were used to identify as many interventions as possible, and the resulting data are detailed and cover a range of topics.

This assessment provides information that can be used to update and advance home fortification interventions globally. It will be useful for multiple audiences, including country-level practitioners, global development partners, donor agencies, home fortification manufacturers, and research institutions. It can also be used to inform the work of the people who are planning and implementing home fortification interventions, as well as those who are promoting these interventions; developing global technical guidance documents, global policies, and programs; and conducting new research.

Acknowledgments

We thank those who helped in the development and implementation of this assessment and the HF-TAG Executive Committee for identifying the focal points from each participating HF-TAG agency.

References

1. Jefferds MED, Ogange L, Owuor M, Cruz K, Person B, Obure A, Suchdev PS, Ruth LJ. Formative research exploring acceptability, utilization, and promotion in order to develop a micronutrient powder (Sprinkles) intervention among Luo families in western Kenya. Food Nutr Bull. 2010; 31:S179–85. [PubMed: 20715602]
2. Tripp K, Perrine CG, de Campos P, Knieriemen M, Hartz R, Ali F, Jefferds ME, Kupka R. Formative research for the development of a market-based home fortification programme for young children in Niger. Matern Child Nutr. 2011; 7:82–95. [PubMed: 21929637]
3. Timmer A, Irizarry L, Tripp K, Flores-Ayala R, Jefferds MED. Regional workshops to scale-up home fortification to improve complementary feeding: collaboration among UNICEF, CDC and partners. Home Fortification with Micronutrient Powders, Sight and Life Special Supplement. Sep. 2013 :42–50.
4. UNICEF/Centers for Disease Control and Prevention. Global assessment of home fortification interventions, 2011. Geneva: Home Fortification Technical Advisory Group; 2013.
5. World Health Organization/Centers for Disease Control and Prevention. Vitamin and mineral nutrition information system. Geneva: WHO; 2011. Logic model for micronutrient interventions in public health. Available at: http://www.who.int/vmnis/toolkit/WHO-CDC_Logic_Model_en.pdf [Accessed 13 August 2013]
6. [Accessed 23 September 2013] Scaling up nutrition: a framework for action. 2010. Available at: http://scalingupnutrition.org/wp-content/uploads/2013/05/SUN_Framework.pdf
7. United Nations General Assembly. [Accessed 13 August 2013] Session 55, Resolution 2. United Nations Millennium Declaration. Available at: http://www.un.org/millennium/declaration/ares552e.pdf
8. McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anaemia, WHO Vitamin and Mineral Nutrition Information System, 1993–2005. Public Health Nutr. 2009; 12:444–54. [PubMed: 18498676]
9. World Health Organization. Guideline: use of multiple micronutrient powders for home fortification of foods consumed by pregnant women. Geneva: WHO; 2011.
10. World Health Organization. Conclusions and recommendations of the WHO consultation on prevention and control of iron deficiency in infants and young children in malaria endemic areas. Food Nutr Bull. 2007; 28:S621–31. [PubMed: 18297899]
11. World Health Organization. Guideline: use of multiple micronutrient powders for home fortification of foods consumed by infants and children 6–23 months of age. Geneva: WHO; 2011.
12. De-Regil LM, Jefferds MED, Peña-Rosas JP. Point-of-use fortification of foods with micronutrient powders containing iron in children of preschool and school age. (Protocol). Cochrane Database Syst Rev. 2012; (2):CD009666.10.1002/14651858.CD009666
13. Ip H, Hyder SMZ, Haseen F, Rahman M, Zlotkin SH. Improved adherence and anaemia cure rates with flexible administration of micronutrient Sprinkles: a new public health approach to anaemia control. Eur J Clin Nutr. 2009; 63:165–72. [PubMed: 17895911]

14. Prata N, Vahidnia F, Potts M, Dries-Daffner I. Revisiting community-based distribution programs: are they still needed? Contraception. 2005; 72:402–7. [PubMed: 16307960]
15. Shediac-Rizkallah MC, Bone LR. Planning for the sustainability of community-based health programs: conceptual frameworks and future directions for research, practice and policy. Health Educ Res. 1998; 13:87–108. [PubMed: 10178339]
16. Scheirer MA. Is sustainability possible? A review and commentary on empirical studies of program sustainability. Am J Evaluation. 2005; 26:320–47.
17. Gruen RL, Elliott JH, Nolan ML, Lawton PD, Parkhill A, McLaren CJ, Lavis JN. Sustainability science: an integrated approach for health-programme planning. Lancet. 2001; 372:1579–89. [PubMed: 18984192]
18. World Health Organization/ExpandNet. Nine steps for developing a scaling up strategy. Geneva: WHO; 2010.
19. Yamey G. Scaling up global health interventions: a proposed framework for success. PLoS Med. 2011; 8:e1001049. [PubMed: 21738450]
20. Bradley EH, Curry LA, Taylor LA, Pallas SW, Talbert-Slagle K, Yuan C, Fox A, Minhas D, Ciccone DK, Berg D, Pérez-Escamilla R. A model for scale up of family health innovations in low-income and middle-income settings: a mixed methods study. BMJ Open. 2012 Aug 24.2(4)10.1136/bmjopen-2012-000987
21. Home Fortification Technical Advisory Group (HF-TAG). Programmatic guidance brief on use of micronutrient powders (MNP) for home fortification. Geneva: HF-TAG; 2011.
22. Home Fortification Technical Advisory Group (HF-TAG). Monitoring manual for developing and implementing monitoring systems for home fortification interventions. Geneva: HF-TAG; 2013.

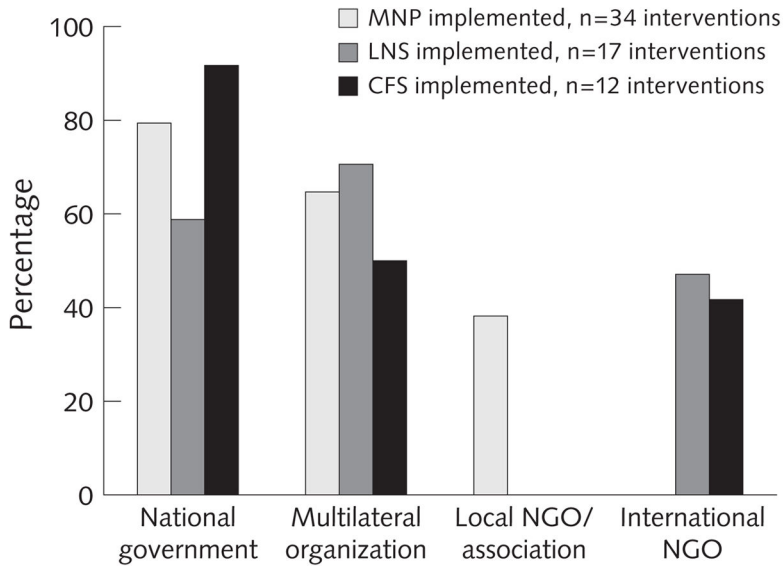

FIG. 1.

Types of organization involved in supporting technical implementation of interventions that use micronutrient powders (MNP), lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS) [4]. Only the three most frequently reported types of organization are shown for each intervention group

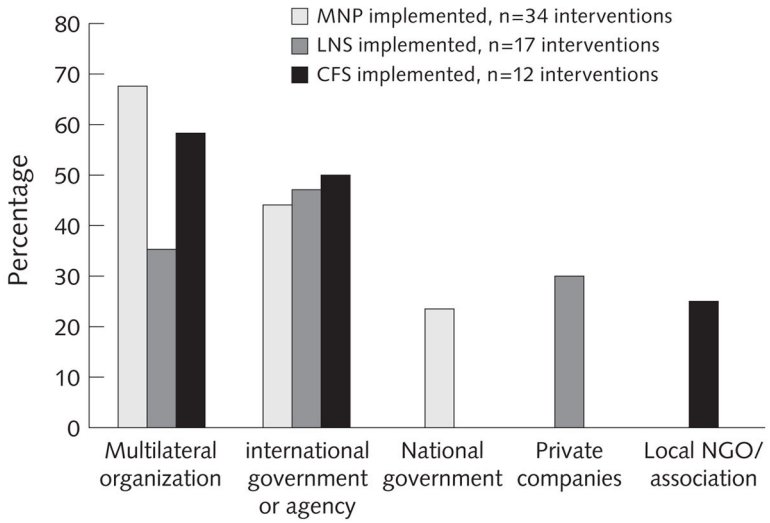

FIG. 2.

Organization types involved in funding interventions that use micronutrient powders (MNP), lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS) [4]. Only the three most frequently reported organization types are shown for each intervention group

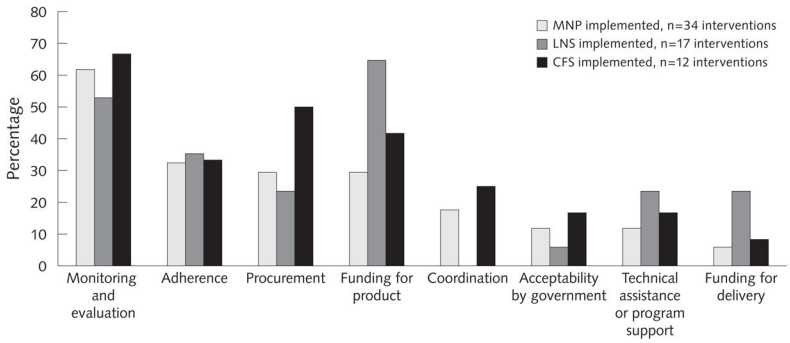

FIG. 3.

Leading challenges to implementing home fortification interventions that use micronutrient powders (MNP), lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS) [4]. Multiple choice answers; totals may equal more than 100%. Respondents were asked to choose the top three challenges to implementing their interventions. Only challenges reported by four or more respondents for each intervention type are presented; the “other” category was excluded

TABLE 1

Home fortification interventions implemented[a] or planned[b] that use micronutrient powders (MNP), lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS), by UNICEF region, Global Assessment of Home Fortification Interventions 2011

Region	Type of intervention used in specific countries				
	MNP intervention implemented	**MNP intervention planned**	**LNS intervention implemented**	**LNS intervention planned**	**CFS intervention implemented**
Latin America and the Caribbean	Bolivia, Colombia, Cuba, Dominican Republic, Ecuador Guatemala, Peru, Uruguay	Columbia, Haiti, Nicaragua	Guatemala		Belize
Central and Eastern Europe	Kyrgyzstan, Tajikistan	Uzbekistan			
Middle East and North Africa			Syria		
Sub-Saharan Africa	Ghana, Madagascar	Sierra Leone, Burkina Faso, Cameroon, Liberia Zambia, Tanzania, Rwanda, Kenya	Chad, Liberia, Mali, Mauritania, Niger, South Sudan, Uganda, Kenya, Madagascar	Cameroon, DR Congo	Niger, Côte d'Ivoire, Ghana, Burkina Faso, Madagascar, Botswana
South Asia	Afghanistan, Bangladesh, Sri Lanka, Pakistan, Nepal	Pakistan, Afghanistan, Bangladesh			
East Asia and Pacific	Indonesia, Lao PDR, Mongolia, China, Cambodia	Timor Leste, China, Myanmar Philippines, Indonesia	Philippines, Lao PDR	Indonesia	China

[a] Home fortification interventions implemented, *n* = 36 countries and *n* = 63 MNP, LNS, or CFS interventions.

[b] Home fortification interventions planned to start within 12 months of the assessment, *n* = 21 countries and *n* = 28 MNP or LNS interventions. There were no planned CFS interventions expected to start within 12 months of the assessment reported.

TABLE 2

Characteristics of implemented[a] and planned[b] home fortification interventions that use micronutrient powders (MNP), lipid-based nutrient supplements (LNS), or powdered complementary food supplements (CFS), Global Assessment of Home Fortification Interventions 2011

	MNP interventions				LNS interventions				CFS interventions	
	Implemented		Planned		Implemented		Planned		Implemented	
Characteristic	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Interventions	34	100.0	25	100.0	17	100.0	3	100.0	12	100.0
Intervention is integrated with other programs	33	97.1	23	92.0	16	94.1	3	100.0	12	100.0
Objective(s) of the intervention[c]										
Anemia prevention and control	32	94.1	23	92.0	5	29.4	3	100.0	9	75.0
Micronutrient deficiency prevention and control	26	76.5	20	80.0	7	41.2	3	100.0	11	91.7
Improved complementary feeding	16	47.1	17	68.0	9	52.9	3	100.0	11	91.7
Reduction of growth stunting	11	32.4	10	40.0	6	35.3	2	66.7	9	75.0
Prevention and treatment of moderate acute malnutrition	0	0.0	0	0.0	9	52.9	2	66.7	0	0.0
Other	3	8.9	3	8.9	2	11.8	0	0.0	0	0.0
Planned final scale of distribution										
Pilot	0	0.0	4	16.0	1	5.9	0	0.0	0	0.0
Subnational	16	47.1	8	32.0	10	58.8	0	0.0	5	41.7
National	17	50.0	9	36.0	3	17.6	0	0.0	7	58.3
Don’t know	1	2.9	4	16.0	3	17.6	3	100.0	0	0.0
Interventions expecting to reach > 100,000 participants in 2011	12	35.3	5	20.0	4	23.5	—	—	3	25.0
Intervention distributed through[c]										
Health facility	17	50.0	10	40.0	12	70.6	1	33.3	6	50.0
Community-based[d]	14	41.2	11	44.0	6	35.3	1	33.3	10	83.3
Scheduled health facility events[e]	8	23.5	4	16.0	7	41.2	1	33.3	5	41.7
Early childhood development centers	5	14.7	2	8.0	0	0.0	0	0.0	0	0.0
General food distribution	4	11.8	3	12.0	5	29.4	0	0.0	1	8.3
School meals	3	8.8	2	8.0	0	0.0	0	0.0	0	0.0
Market-based[f]	3	8.8	1	4.0	0	0.0	0	0.0	6	50.0

Food Nutr Bull. Author manuscript; available in PMC 2015 August 24.

Characteristic	MNP interventions				LNS interventions				CFS interventions	
	Implemented		Planned		Implemented		Planned		Implemented	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%
Other	0	0.0	5	20.0	0	0.0	0	0.0	0	0.0
Home fortification products distributed to participants monthly	12	35.3	7	28.0	14	82.4	3	100.0	6	50.0
Behavior change communication strategy in place	27	79.4	3	12.0	14	82.4	0	0.0	12	100.0
Local name developed for home fortification product	29	85.3	7	28.0	0	0.0	2	66.7	9	75.0
Local image developed for home fortification product	18	52.9	3	12.0	0	0.0	2	66.7	5	41.7
Monitoring and evaluation plan in place	30	88.2	10	40.0	13	76.5	0	0.0	11	91.7
Protocol in place to check quality of home fortification products	24	70.6	7	28.0	10	58.8	0	0.0	11	91.7

[a] Home fortification interventions implemented, *n* = 36 countries and *n* = 63 MNP, LNS, or CFS interventions.

[b] Home fortification interventions planned to start within 12 months of the assessment, *n* = 21 countries and *n* = 28 MNP or LNS interventions. There were no planned CFS interventions expected to start within 12 months of the assessment reported.

[c] Multiple choice answers; totals may equal more than 100%.

[d] Examples include groups, home visits, and community events.

[e] Examples include child health days, immunization campaigns, and outreach activities.

[f] Examples include items sold in communities by volunteers or the private sector (e.g., shops, pharmacies, drugstores).